

WHAT IS CLAIMED IS:

1. A micro magnetic switch, the switch comprising:
 - a reference plane;
 - a magnet, located proximate to a supporting structure, that produces a first magnetic field with non-uniformly spaced field lines approximately orthogonal to the reference plane;
 - a cantilever, supported by the support structure, having an axis of rotation lying in the reference plane, and having magnetic material that makes the cantilever sensitive to the first magnetic field, such that the cantilever is configured to rotate about the axis of rotation between first and second states;
 - a conductor, located proximate to the supporting structure and the cantilever, configured to conduct a current, wherein the current produces a second magnetic field having a component approximately parallel to the reference plane and approximately perpendicular to the rotational axis of the cantilever, which causes the cantilever to switch between the first and second states; and
 - a stopping device, located proximate to the supporting structure, operable to stop the cantilever from rotating about the axis of symmetry beyond a point at which a longitudinal axis of the cantilever is approximately parallel to a longitudinal axis of the magnet.
2. The switch of claim 1, wherein:
 - the first state is an ON state; and
 - the second state is a temporary OFF state.

3. The switch of claim 1, wherein:
the first state is an OFF state; and
the second state is a temporary ON state.
4. The switch of claim 1, wherein once switched to a one of the first and second states, the cantilever is latched in the one of the first and second states by the first magnetic field until further switching occurs.
5. The switch of claim 1, wherein the conductor and the cantilever are formed on the supporting structure.
6. The switch of claim 1, wherein the cantilever is provided between the substrate and the magnet.
7. The switch of claim 1, wherein a magnitude of the second magnetic field is smaller than a magnitude of the first magnetic field.
8. The switch of claim 1, wherein the supporting structure is positioned between the cantilever and the magnet.
9. The switch of claim 1, wherein the supporting structure is a substrate.
10. The switch of claim 1, wherein one of the first and second states is a temporary state.

11. A micro magnetic switch, the switch comprising:
 - a magnet, located proximate to a supporting structure, the magnet producing a first magnetic field with field lines symmetrically spaced about a central axis;
 - a cantilever, supported by the supporting structure, having a magnetic material and a longitudinal axis, the magnetic material making the cantilever sensitive to the first magnetic field, such that the cantilever is configured to move between first and second states;
 - a conductor, located proximate to the supporting structure and the cantilever, configured to conduct a current, wherein the current produces a second magnetic field that causes the cantilever to switch between the first and second states; and
 - a stopping device, located proximate the supporting structure, and operable to stop the cantilever from rotating beyond a point at which the longitudinal axis of the cantilever is approximately parallel to a longitudinal axis of the magnet.
12. The switch of claim 11, further comprising:
 - a reference plane, wherein the symmetrically spaced field lines are at varying angles with respect to the reference plane.
13. The switch of claim 11, wherein:
 - the first state is an ON state; and
 - the second state is a temporary OFF state.
14. The switch of claim 11, wherein:
 - the first state is an OFF state; and
 - the second state is a temporary ON state.

15. The switch of claim 11, wherein once switched to a one of the first and second states, the cantilever is latched in the one of the first and second states by the first magnetic field until further switching occurs.

16. The switch of claim 11, wherein the conductor and the cantilever are formed on the supporting structure.

17. The switch of claim 11, wherein the cantilever is provided between the substrate and the magnet.

18. The switch of claim 11, wherein a magnitude of the second magnetic field is smaller than a magnitude of the first magnetic field.

19. The switch of claim 11, wherein the supporting structure is positioned between the cantilever and the magnet.

20. The switch of claim 11, wherein the supporting structure is a substrate.

21. The switch of claim 11, wherein one of the first and second states is a temporary state.

22. A micro magnetic switch, the switch comprising:

a reference plane;

a magnet, located proximate to a supporting structure, that produces a first magnetic field with uniformly spaced field lines approximately orthogonal to the reference plane;

a cantilever, supported by the support structure, having an axis of rotation lying in the reference plane, and having magnetic material that makes the cantilever sensitive to the first magnetic field, such that the cantilever is configured to rotate about the axis of rotation between first and second states;

a conductor, located proximate to the supporting structure and the cantilever, configured to conduct a current, wherein the current produces a second magnetic field having a component approximately parallel to the reference plane and approximately perpendicular to the rotational axis of the cantilever, which causes the cantilever to switch between the first and second states; and

a stopping device, located proximate to the supporting structure, operable to stop the cantilever from rotating about the axis of symmetry beyond a point at which a longitudinal axis of the cantilever is approximately parallel to a longitudinal axis of the magnet.

23. The switch of claim 22, wherein:

the first state is an ON state; and

the second state is a temporary OFF state.

24. The switch of claim 22, wherein:

the first state is an OFF state; and

the second state is a temporary ON state.

25. The switch of claim 22, wherein once switched to a one of the first and second states, the cantilever is latched in the one of the first and second states by the first magnetic field until further switching occurs.

26. The switch of claim 22, wherein the conductor and the cantilever are formed on the supporting structure.

27. The switch of claim 22, wherein the cantilever is provided between the substrate and the magnet.

28. The switch of claim 22, wherein a magnitude of the second magnetic field is smaller than a magnitude of the first magnetic field.

29. The switch of claim 22, wherein the supporting structure is positioned between the cantilever and the magnet.

30. The switch of claim 22, wherein the supporting structure is a substrate.

31. The switch of claim 22, wherein one of the first and second states is a temporary state.

32. A latching micro magnetic switch, the switch comprising:
a reference plane;

a magnet, located proximate to a supporting structure, the magnet producing a first magnetic field with uniformly spaced field lines at obtuse angles with respect to the reference plane;

a cantilever, supported by the supporting structure, having an axis of rotation lying in the reference plane, and having a magnetic material that makes the cantilever sensitive to the first magnetic field, such that the cantilever can rotate about the axis of rotation between first and second states; and

a conductor, located proximate to the supporting structure and the cantilever, configured to conduct a current, wherein the current produces a second magnetic field having a component approximately parallel to the reference plane and approximately perpendicular to the rotational axis of the cantilever, which causes the cantilever to switch between the first and second states.

33. The switch of claim 32, wherein once switched to a one of the first and second states, the cantilever is latched in the one of the first and second states by the first magnetic field until further switching occurs.

34. The switch of claim 32, wherein the conductor and the cantilever are formed on the supporting structure.

35. The switch of claim 32, wherein the cantilever is provided between the substrate and the magnet.

36. The switch of claim 32, wherein a magnitude of the second magnetic field is smaller than a magnitude of the first magnetic field.

37. The switch of claim 32, wherein the supporting structure is positioned between the cantilever and the magnet.

38. The switch of claim 32, wherein the supporting structure is a substrate.

39. The switch of claim 32, wherein:
the first state is an ON state during; and
the second state is an OFF state.

40. The switch of claim 32, wherein:
the first state is an OFF state; and
the second state is an ON state.

41. The switch of claim 32, wherein a longitudinal axis of the permanent magnet is at an acute angle within respect to a longitudinal axis of the supporting structure.

42. The switch of claim 32, wherein a longitudinal axis of the permanent magnet is substantially parallel to a longitudinal axis of the supporting structure.

43. The switch of claim 32, wherein one of the first and second states is a temporary state.